



Certificate / Certificat Zertifikat / 合格証

BIS 1409090 C001

exida hereby confirms that the:

ST Solenoid Valve Series

BiS Valves Ltd.

Wimborne, Dorset - UK

The manufacturer
may use the mark:



Has been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-7

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

**PFD_{AVG} and Architecture Constraints
must be verified for each application**

Valid until October 1, 2018

Revision 1.0 September 14, 2015

Safety Function:

The Directional Control Valve will move to the designed safe position when the Solenoid is De-energized (or Energized) within the specified safety time.

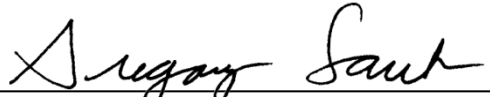
Application Restrictions:

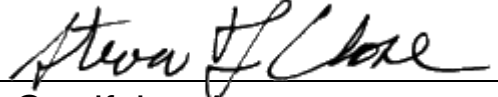
The unit must be properly designed into a Safety Instrumented Function per the Safety Manual requirements.



ANSI Accredited Program
PRODUCT CERTIFICATION
#1004




Evaluating Assessor


Certifying Assessor

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

PFD_{AVG} and Architecture Constraints must be verified for each application

Systematic Capability :

The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

A Safety Instrumented Function (SIF) designed with this product must not be used at a SIL level higher than stated.

Random Capability:

The SIL limit imposed by the Architectural Constraints must be met for each element. This device meets *exida* criteria for Route 2_H.

Versions:

Valve Types		Description and Application
2/3AS*-ST*- or 2/2AS*-ST*-	Opt 1 & Opt 2	Series ST Solenoid with 3/2 (or 2/2) Pneumatic or Hydraulic Valve, De-energize To Trip (DTT), including MO/MR and Latching options
	Opt 3 & Opt 4	Series ST Solenoid with 3/2 (or 2/2) Pneumatic or Hydraulic Valve, Energize To Trip (ETT)
2/5AS*-ST*-	DTT	5/2 Pneumatic or Hydraulic Valve, Solenoid Actuator, De-energize To Trip (DTT), including MO/MR and Latching options
	ETT	5/2 Pneumatic or Hydraulic Valve, Solenoid Actuator, Energize To Trip (ETT)
2*DS01*-ST*- or 2*DS01*-STSW*-	Opt 1 & Opt 2	Series ST Solenoid with 3/2 (or 2/2) Hydraulic Valve, De-energize To Trip (DTT), MO/MR and Latching options only included for Topside Models
	Opt 3 & Opt 4	Series ST Solenoid with 3/2 (or 2/2) Hydraulic Valve, Energize To Trip (ETT)

Failure rates according to IEC 61508 in FIT¹

Valve Types		No Diagnostics		With PVST ² Diagnostics			
		λ _{SU}	λ _{DU}	λ _{SD}	λ _{SU}	λ _{DD}	λ _{DU}
2/3AS*-ST*- or 2/2AS*-ST*-	DTT Opt 1	421	105	411	10	92	13
	DTT Opt 2	354	192	351	3	170	22
	ETT Opt 3	23	298	21	2	277	21
	ETT Opt 4	105	232	95	10	217	15
2/5AS*- ST*-	DTT	380	155	374	6	137	18
	ETT	66	266	59	7	248	18
2*DS01*-ST*- or 2*DS01*-STSW*-	DTT Opt 1	373	117	368	5	93	24
	DTT Opt 2	347	196	344	3	168	28
	ETT Opt 3	33	259	30	3	230	29
	ETT Opt 4	99	237	89	10	215	22

¹ FIT = 1 failure / 10⁹ hours

² PVST = Automated Partial Valve Stroke Test of Final Element Valve

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{avg} considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Report: BiS 14/09-090 R002 V1 R1

Safety Manual: I.0100.00.0383 Issue 1 (or later)

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